

great variety are found in searching mountains, visiting caverns, and descending into mines. There are few of the naturalists, accustomed to these researches, who shall observe the basaltes above-mentioned, but will be inclined to consider them as so many crystallisations. I do not think, that the great extent of these masses, which have been discovered, and the bigness of the stones, which compose them, form any objection against this notion. I am, with very great esteem,

S I R,

Your most humble

and most obedient servant,

A. Trembley.

LXXXVIII. *An Account of a Work published in Italian by Vitaliano Donati, M. D. containing, An Essay towards a Natural History of the Adriatic Sea : By Mr. Abraham Trembley, F. R. S. Translated from the French, by Thomas Birch, D. D. Secret. R. S.*

Read April 1, 1756. **T**HIS work of Dr. Donati, printed at Venice in 1750, is written in Italian, in the form of a letter addressed to Monsignor Leprotti, physician to the Pope, dated at Knitz, on the borders of Bosnia, the 2d of November, 1748. This letter contains but a small part of the observations



tions, which have been made by Dr. Donati. He has collected them into a much more considerable work, in which he had already made a great progress. The subject is very extensive, and one of the most curious ; and certainly requires, in order to its being treated of in a proper manner, all the genius, patience, and resolution, which distinguish Dr. Donati to so much advantage among the naturalists.

The sea contains a prodigious number of organized bodies, very difficult to be observed on account of their situation ; extremely different, in many respects, from the plants and animals of the earth ; and which, for that reason, must necessarily discover to us new laws in nature.

Dr. Donati has not confined himself to these objects, tho' so numerous and so interesting. The observations, which he has made upon a great number of marine fossils found in the earth, and upon the several soils, in which they are discovered, have led him to think, that there must be some affinity and resemblance between those parts of the earth, which are actually covered by the waters of the sea, and those, which are not so. This idea, as is easily imagined, has opened a vast field to his researches. He was engaged by it to examine carefully the various soils of the countries, which surround the Adriatic sea, and to endeavour to discover the different fossils contained in them. But, what is a still more difficult and newer task, he was induced to try to make himself master of the nature of the soils and the fossils at the bottom of the sea, in order to be able to compare the one with the other.

Dr. Donati had recourse to different expedients for observing the bottom of the sea. He took the advantage of calm weather, to view it from his bark to the depth of twelve or fifteen feet, in places where the water is transparent. By this means he informed himself, what the disposition of the soil is under the water to a certain depth, and what the bodies are, which cover it. He then drew up those bodies into his bark, that he might more closely examine them. For this purpose he contrived the instruments described by him, with which he was enabled to take up from the bottom of the sea, even to very great depths, marine bodies and masses of a considerable bulk. In this manner he passed through the northern part of the Adriatic Sea, and made use of these instruments for many miles of ground. On the coast of Italy he extended his search as far as Ancona; and, on the opposite shore, he proceeded to the farthest parts of Albania, and stopped at the gulph of Lodrino.

These coasts are bordered with a great number of islands and rocks; some of which lie at a pretty distance from the shore. Dr. Donati considered these rocks and islands as a continuation of the soil at the bottom of the sea surrounding them. The observations, made by him on these islands and rocks, when compared with those, which he made on the bodies taken up from the bottom of the sea, could not but afford great light with respect to the different objects of his inquiries.

He did not rest here, but examined, with the same view, the countries, which surround the seas above-mentioned. His excursions to the east of the Adriatic

Adriatic Sea were very considerable, very fatiguing, and very dangerous. His passion for natural history, his particular inclination to botany, and the pleasure of pursuing his researches into countries before unknown to observers, made him resolutely surmount those difficulties.

His inquiries have enabled him to determine upon his own knowledge, that there is very little difference between the bottom of the Adriatic Sea and the surface of the neighbouring countries. There are at the bottom of the water, mountains, plains, vallies, and caverns, just as upon the land. The soil consists of different strata placed one upon another; and, for the most part, parallel and correspondent to those of the rocks, islands, and neighbouring continents. They contain stones of different sorts, minerals, metals, various petrified bodies, pumice-stone, lava's, formed by Volcanos.

Istria, Morlachia, Dalmatia, Albania, and some other adjacent countries, as well as the rocks, the islands, and the correspondent bottom of the Adriatic Sea, consist of a mass of a whitish marble, of an uniform grain, and of almost an equal hardness. It is that kind of marble called by the Italians *marmo di Rovigno*, and known to the antients by the name of *marmor Traguriense*.

This vast bed of marble, in many places under both the earth and the sea, is interrupted by several other kinds of marble, and covered by a great variety of bodies. There are discovered there, for instance, gravel, sand, and earths more or less fat.

The

The variety of these soils under the sea is remarkable. It is to this, that Dr. Donati ascribes the varieties observed with respect to the nature and quantity of plants and animals found at the bottom of the sea. Some places are inhabited by a great number of different species of plants and animals ; in others, only some particular species are found ; and lastly, there are other places, in which neither plants nor animals are to be met with.

These observations not only point out to us the affinity and resemblance between the surface of the earth and the bottom of the sea ; but may likewise contribute to discover to us one cause of the varieties, which are observed in the distribution of the marine fossils found in the earth.

Dr. Donati remarked in that vast mass of marble, which is common to the bottom of one part of the Adriatic Sea, and to the neighbouring provinces towards the east, a multitude of marine bodies petrified ; some of which are so united to the stony substance, that they are scarce to be distinguished. He found in some places human bones petrified, which form one mass with a mixture of marble, red earth, and stalactites.

One of the objects, which most excited the attention of our author, was a crust, which he discovered under the water in divers places, and for a great extent. It is a composition of crustaceous and testaceous bodies and beds of polypes of different kinds, confusedly blended with earth, sand, and gravel.

These different marine bodies, which enter into the composition of this crust, are found at the depth

of a foot or more, intirely petrified and reduced into marble. At less than the depth of a foot they approach nearer to their natural state. And at the surface of this crust, they are either dead, though extremely well preserved, or still living.

This observation demonstrates, that stones or petrifactions may be formed, and actually are formed, in great quantities under the water.

It is to be remarked, that these crustaceous and testaceous bodies and beds of polypes, mentioned above, are every-where mingled in the utmost confusion with each other: which shews a striking resemblance between the crust discovered at the bottom of the sea, and those of the marine bodies petrified, found in many parts under the earth, and especially in Italy. If these marine bodies petrified are naturally in that confusion in the sea; if they were born and die; and if they have been petrified in that state; it is highly probable, that those, which are found under-ground in the strata in such confusion, are likewise placed naturally in the same manner under the sea, when it covers them, and not by means of extraordinary events, such as volcanos and earthquakes, as has been conjectured.

The more these testaceous and crustaceous bodies and beds of polypes multiply, the more their exuviae and skeletons contribute to inlarge this crust discovered at the bottom of the sea. Dr. Donati remarked, that in several parts it formed very considerable banks, and of a very great thickness.

It follows from hence, that the bottom of the sea is constantly rising higher and higher. Divers other causes contribute to it. Snow and rain-waters bring down

down from the neighbouring mountains, into the sea, a great quantity of earth and stones. The waves, beating against the shores of the continent and islands, detach many masses, which are spread upon the bottom of the sea. The rivers carry the mud with their waters into the sea, at the bottom of which that mud deposits itself.

From the rising of the bottom of the sea, that of the level of the water naturally follows. Dr. Donati furnishes us with a great number of facts in proof of this. He observed, that at Venice, in Istria, and in Dalmatia, the level of the waters is several feet higher than it was formerly. This elevation of the waters is observed only on the northern and eastern coasts of the Adriatic. The sea seems, on the contrary, to abandon the western coast, that of Italy. This Dr. Donati has shewn by many very interesting facts.

He proceeds then to the observations, which he made upon the plants and animals of the Adriatic Sea.

He begins with some general reflections upon the nature of both. Upon this occasion he treats of the question concerning the resemblance between plants and animals, and in general of the chain, which these different organised bodies form by the affinity between them established by nature.

Dr. Donati, in mentioning the facts, which shew this imperceptible transition from the class of animals to that of plants, seems inclined to believe, that these facts are most frequently to be met with in the waters.

After having given a description of several very curious marine plants, he proceeds to the beds of polypes. He gives this name to all those organised bodies, known under the name of coralline bodies; and which were, for a long time, ranged under the class of plants. He then mentions different bodies, which he calls plant-animals, and animal-plants, according to the characters, which he found belonging to them, and which bring them more or less near to one or other of these general classes.

It would be too extensive a design to follow our author through all the curious details, which he gives upon this subject. Besides that an extract of that part of his work was read at a meeting of this Royal Society, and is printed in the 47th volume, p. 95. of the *Philosophical Transactions*.